

Client:

Estuary View Enterprises 2020 Ltd.

Project:

Bessborough SHD Development

Report:

Flood Risk Assessment



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SECTION 1: INTRODUCTION

1.1 General

J. B. Barry and Partners Limited was commissioned by Estuary View Enterprises 2020 Ltd. to undertake a site-specific Flood Risk Assessment (FRA) in respect of an SHD planning application for a proposed residential development at Ballinure, Blackrock, Co. Cork. The aim of the FRA is to identify, quantify and communicate to decision makers and other stakeholders the risk of flooding associated with the proposed development.

The FRA has been carried out in accordance with 'The Planning System and Flood Risk Management Guidelines' (hereafter referred to as the FRM Guidelines) published in November 2009 jointly by the then Department of the Environment, Heritage and Local Government, DEHLG, (now the Department of the Environment, Community and Local Government, DECLG) and the Office of Public Works (OPW).

The proposed development is located at Phase 1- 'The Meadows', Bessborough, Ballinure, Blackrock, Cork, on a circa 2.29-hectare site, with a developable area of 1.53-hectares, see *Figure 1-1* below. This proposed development will form Phase 1 of a larger development on a circa 16.59-hectare site, see *Figure 1.2* for outline phasing proposals.

The Passage West Greenway forms the eastern boundary of the proposed development site, and the South Ring Road (N40) is located approximately 200m from the southern boundary of the proposed development. The western and northern boundaries of the Phase 1 site are formed by the buildings, outbuildings, roads and open spaces of the overall Bessborough complex. The site slopes gently from north to south, with ground levels falling from approximately 14.50 m OD to 11.25 m OD across the site.



Figure 1-1: Location of Proposed Development
(Source: Google Maps, annotation by J.B. Barry and Partners)



The development will consist of the construction of a residential development of 280 no. residential apartment units with supporting tenant amenity facilities, café, crèche, and all ancillary site development works. The proposed development includes 280 no. apartments to be provided as follows: Block A (6 no. studio apartments, 14 no. 1-bedroom, 34 no. 2-bedroom & 1 no. 3-bedroom over 1-6 storeys), Block B (37 no. 1-bedroom & 49 no. 2-bedroom over 6-10 storeys), Block C (31 no. 1-bedroom, 36 no. 2-bedroom & 6 no. 3-bedroom over 5-9 storeys) and Block D (30 no. 1-bedroom, 31 no. 2-bedroom & 5 no. 3-bedroom over 6-7 storeys).

The proposed development provides for outdoor amenity areas, landscaping, under-podium and street car parking, bicycle parking, bin stores, 2 no. substations one of which is single storey free standing, a single storey carpark access building, public lighting, roof mounted solar panels, wastewater infrastructure including new inlet sewer to the Bessborough Wastewater Pumping Station to the west, surface water attenuation, water utility services and all ancillary site development works. Vehicular access to the proposed development will be provided via the existing access road off the Bessboro Road. See *Figure 1-3* for proposed site layout plan.



Figure 1-3: Proposed Phase 1 Site Layout Plan

SECTION 2: FLOOD RISK ASSESSMENT METHODOLOGY

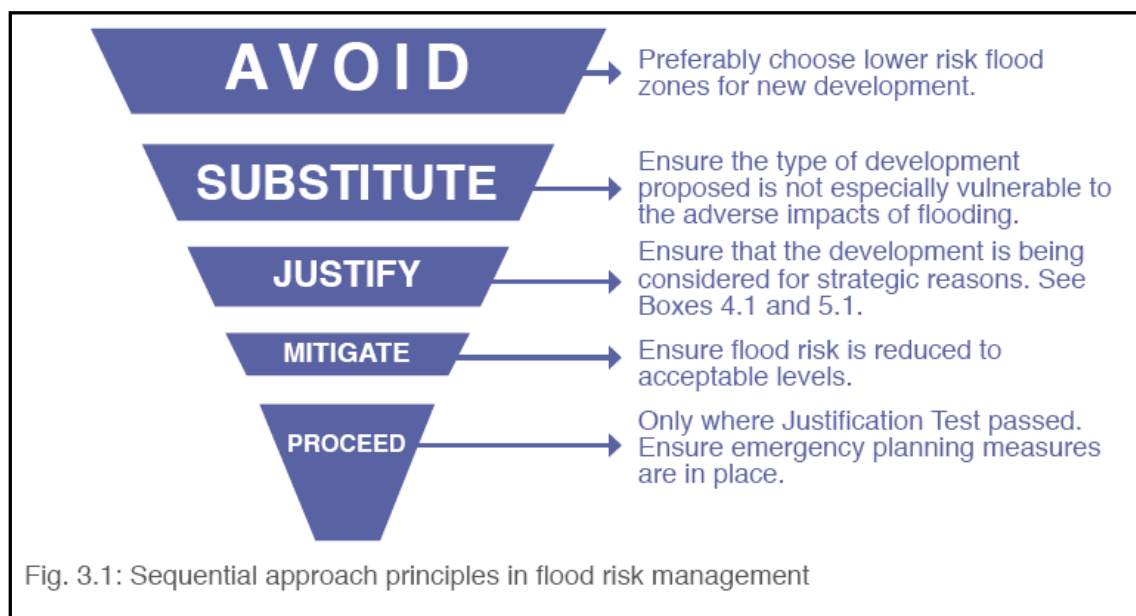
2.1 Methodology

The methodology used for the flood risk assessment for the proposed development is based on 'The Planning System and Flood Risk Management, Guidelines for Planning Authorities' (2009). The FRM Guidelines require the planning system at national, regional and local levels to:

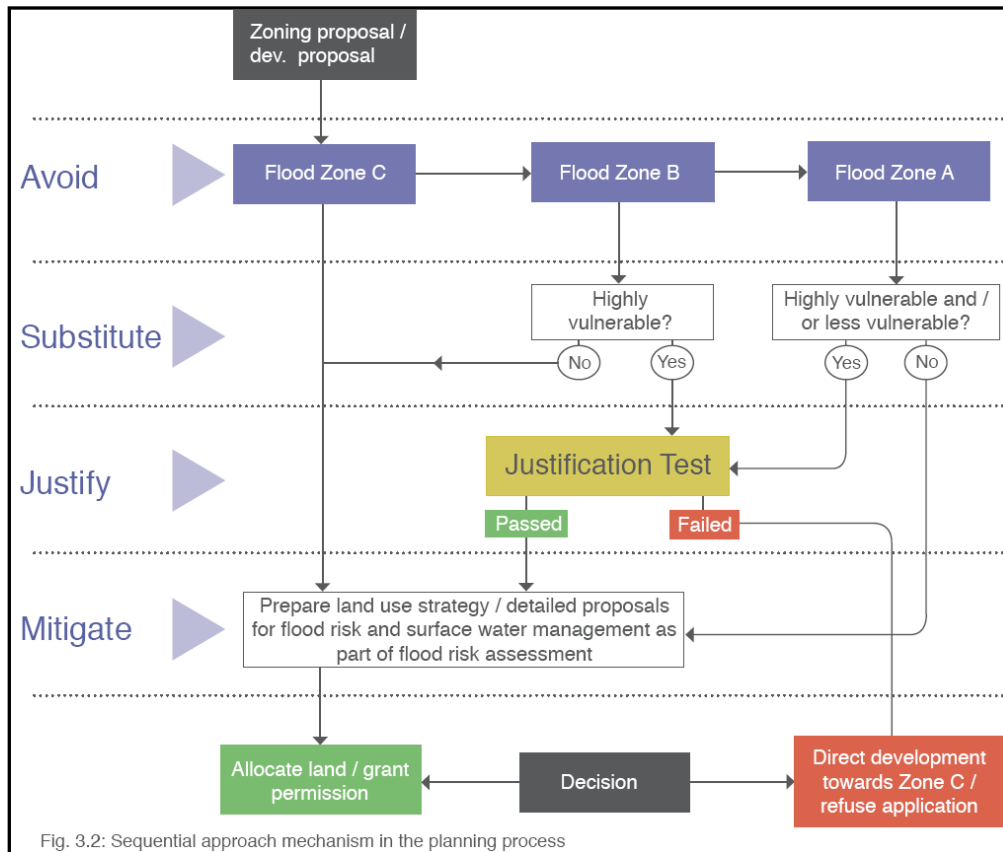
- Avoid development in areas at risk of flooding, particularly floodplains, unless there are proven wider sustainability grounds that justify appropriate development;
- Adopt a sequential approach to flood risk management when assessing the location for new development based on avoidance, reduction and then mitigation of flood risk; and
- Incorporate flood risk assessment into the process of making decisions on planning applications and planning appeals.

The sequential approach (see Figure 3.1 of the FRM Guidelines below) in flood risk management requires the following three steps to identify the necessity for the justification test for a development:

- Step 1: Identification of the Flood Zone at the proposed development site (Section 2.23 of the FRM Guidelines);
- Step 2: Identification of the vulnerability of the type of the proposed development (Table 3.1 of the FRM Guidelines); and
- Step 3: Using the matrix of vulnerability versus Flood Zone (Table 3.2 of the FRM Guidelines), identify the necessity for the justification test for the proposed development.



While Figure 3.1 of The FRM Guidelines sets out the broad philosophy underpinning the sequential approach in the flood risk management, Figure 3.2 of the Guidelines (shown below) describes the mechanism of the sequential approach for use in the planning process.



According to the FRM Guidelines, Flood Zones are graphical areas within which the likelihood of flooding is in a particular range. They are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning. There are three Flood Zones, namely,

- **Flood Zone A** – where the probability of flooding from rivers and the sea is highest (greater than 1% AEP or 1 in 100 year for river flooding or 0.5% or 1 in 200 for coastal flooding);
- **Flood Zone B** – where the probability of flooding from rivers and the sea is moderate (between 0.1% AEP or 1 in 1000 year and 1% AEP or 1 in 100 year for river flooding and between 0.1% AEP or 1 in 1000 year and 0.5% AEP or 1 in 200 year for coastal flooding); and
- **Flood Zone C** – where the probability of flooding from rivers and the sea is low (less than 0.1% AEP or 1 in 1000 for both river and coastal flooding).

Flood Zones A, B and C are based on the current assessment of the 1% AEP and the 0.1% AEP fluvial events and the 0.5% AEP and 0.1% AEP tidal events, without the inclusion of climate change factors. Table 3.1 of the FRM Guidelines (see below) shows the classification of the vulnerability to flooding of different types of development.

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	<p>Garda, ambulance and fire stations and command centres required to be operational during flooding;</p> <p>Hospitals;</p> <p>Emergency access and egress points;</p> <p>Schools;</p> <p>Dwelling houses, student halls of residence and hostels;</p> <p>Residential institutions such as residential care homes, children's homes and social services homes;</p> <p>Caravans and mobile home parks;</p> <p>Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and</p> <p>Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.</p>
Less vulnerable development	<p>Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions;</p> <p>Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans;</p> <p>Land and buildings used for agriculture and forestry;</p> <p>Waste treatment (except landfill and hazardous waste);</p> <p>Mineral working and processing; and</p> <p>Local transport infrastructure.</p>
Water-compatible development	<p>Flood control infrastructure;</p> <p>Docks, marinas and wharves;</p> <p>Navigation facilities;</p> <p>Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location;</p> <p>Water-based recreation and tourism (excluding sleeping accommodation);</p> <p>Lifeguard and coastguard stations;</p> <p>Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and</p> <p>Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).</p>
*Uses not listed here should be considered on their own merits	

Table 3.1 Classification of vulnerability of different types of development

Table 3.2 of the FRM Guidelines (shown below) identifies the types of development that would be appropriate for each Flood Zone and those that would be required to meet the Justification Test. Since dwelling homes are classified as 'Highly vulnerable development' the section highlighted in Table 3.2 presents the required actions for each flood zone.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 3.2: Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

The FRM Guidelines (Chapter 2) outlines the following three stages of flood risk assessment:

Stage 1: Flood risk identification – to identify whether there may be any flooding or surface water management issues relating to the proposed development site that may warrant further investigations.

Stage 2: Initial flood risk assessment – to confirm sources of flooding that may affect the proposed development site, to appraise the adequacy of existing information and to determine what surveys and modelling approach is appropriate to match the spatial resolution required and complexity of the flood risk issues. This stage involves the review of existing studies and hydraulic modelling to assess flood risk and to assist with the development of FRM measures.

Stage 3: Detailed flood risk assessment – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development, of its potential impacts on flood risk elsewhere and of the effectiveness of any proposed mitigation measures. This will typically involve use of an existing or construction of a hydraulic model across a wide enough area to appreciate the catchment wide impacts and hydrological process involved.

2.2 Data Collection

Data required for the flood risk assessment was obtained from various sources, as described below.

- The historic flood data was obtained from the National Flood Hazard Mapping website www.floodmaps.ie;
- The Subsoil and Aquifer vulnerability data was obtained from the Geological Survey of Ireland website www.gsi.ie;
- [National CFRAM Study](#);
- Cork City Council Development Plan 2015 – 2021;
- Cork City Council Flood Maps;

SECTION 3: EXISTING HYDROLOGICAL ENVIRONMENT

3.1 Salient Hydrological Features

The main hydrological feature of the area is the Douglas Estuary. The proposed development site is located approximately 260m north to the estuary of the Douglas Estuary where the river discharges to Lough Mahon. *Figure 3-1* below illustrates the main hydrological features associated with the site.

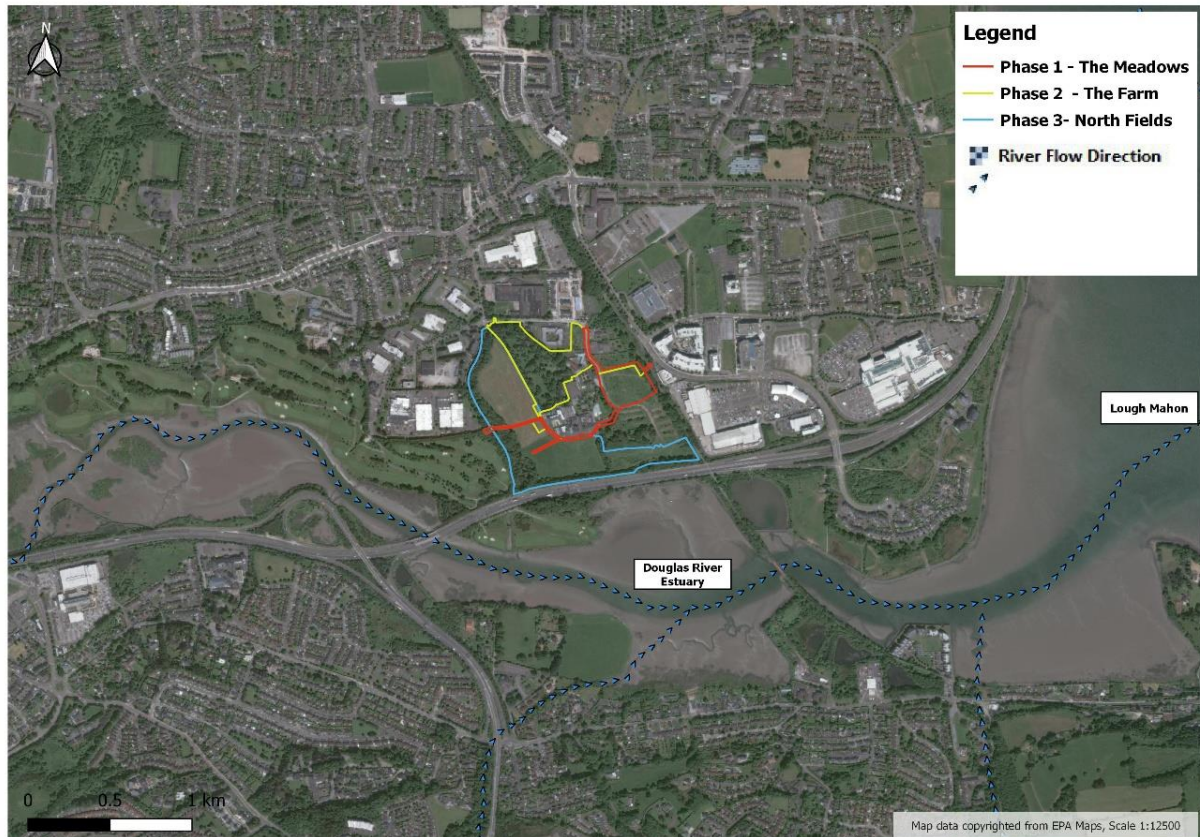


Figure 3-1: Hydrological Features of the Area

(Source: Google Maps, annotation by J.B. Barry and Partners)

3.2 Existing Geology and Hydrogeology of the Area

The Geological Survey of Ireland (GSI) website provides information on their public online mapping service at www.gsi.ie on subsoil type and aquifer vulnerability. The maps presented in *Figure 3-2* and *Figure 3-3* depict the subsoil type and aquifer vulnerability for the proposed development site. The GSI subsoil mapping (*Figure 3-2*) indicates that made ground is the dominant ground condition within the environs of the proposed development site due to the urban nature of the site.

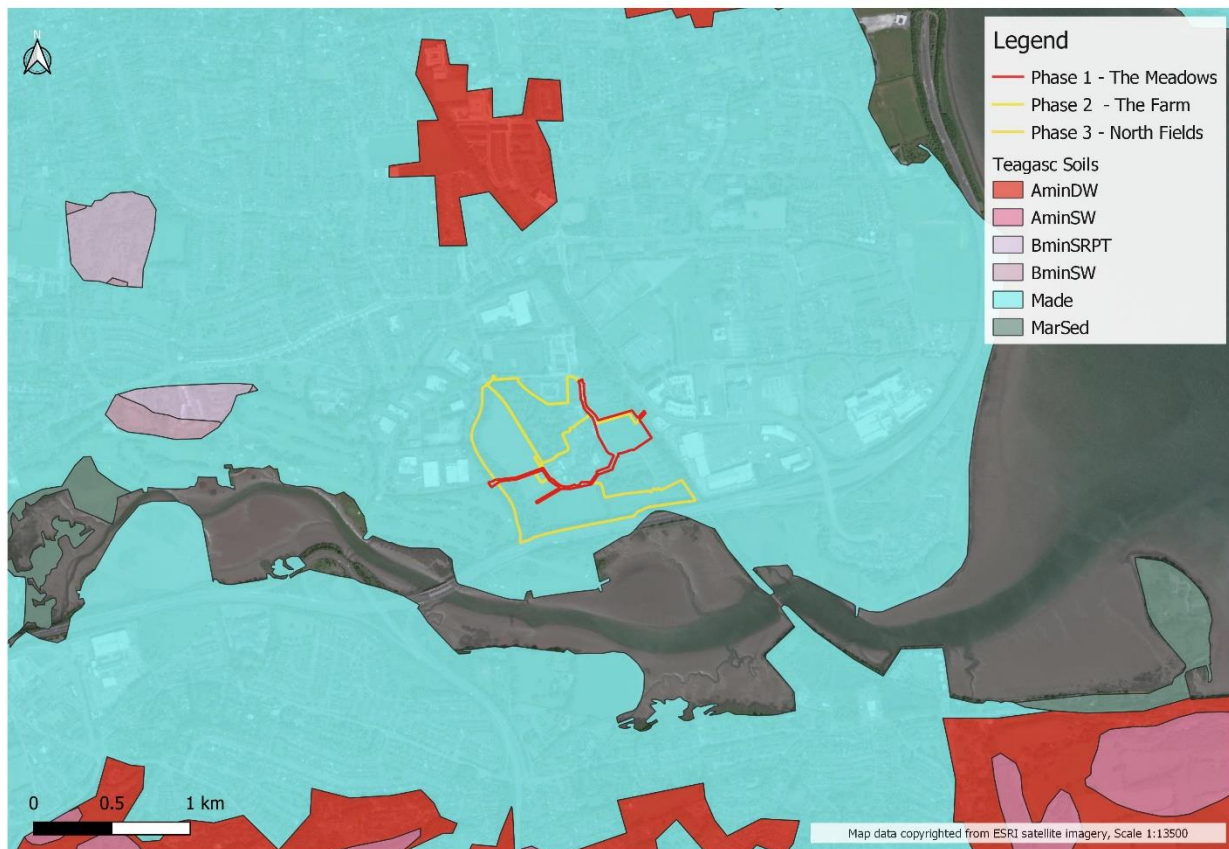


Figure 3-2: GSI Subsoil Mapping

(Source: www.gsi.ie, annotation by J.B. Barry and Partners)

Furthermore, the interactive web-mapping site classifies the aquifer vulnerability in this region as having a high vulnerability rating (*Figure 3-3*). The GSI state that “Vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities.” The GSI further describes that the vulnerability of groundwater depends on:

- The time of travel of infiltrating water (and contaminants);
- The relative quantity of contaminants that can reach the groundwater; and
- The contaminant attenuation capacity of the geological materials through which the water and contaminants infiltrate

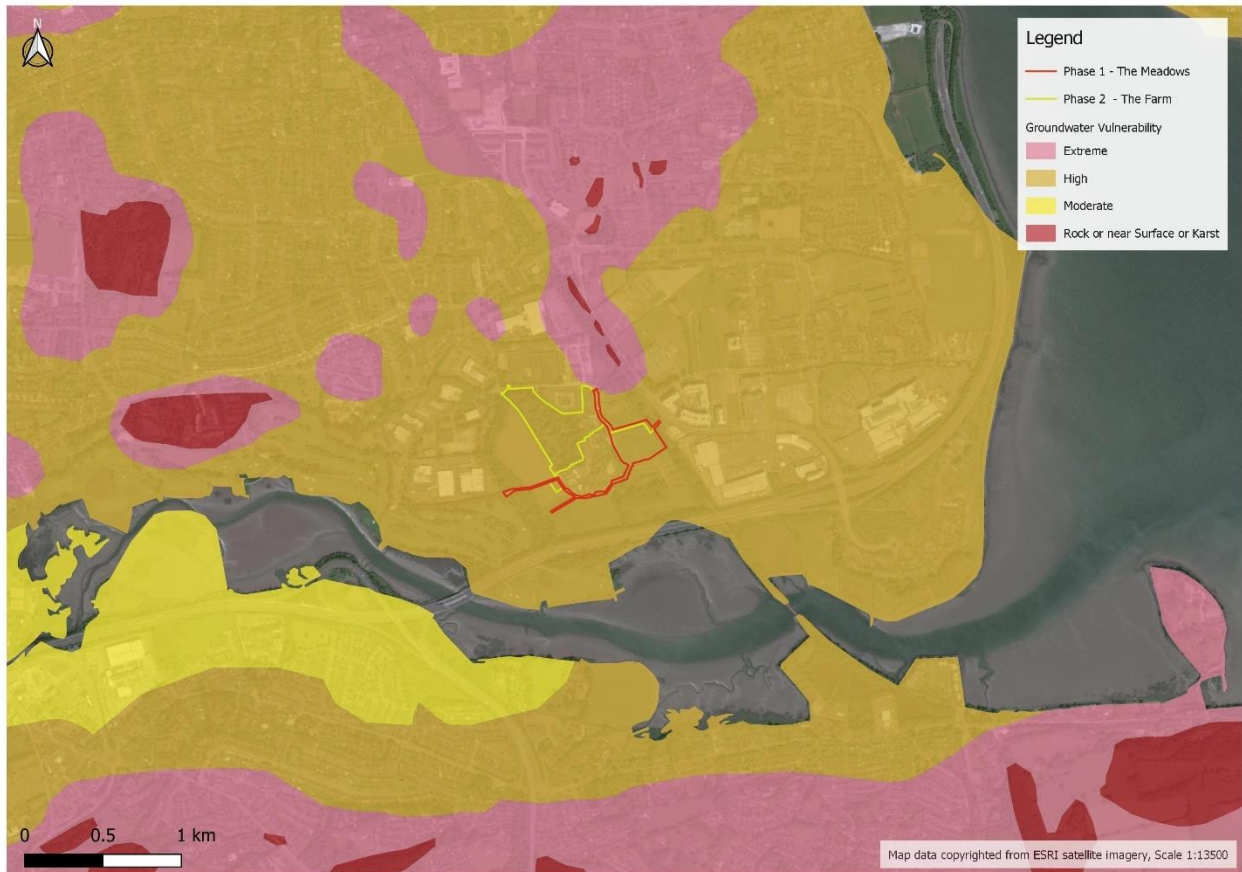


Figure 3-3: GSI Aquifer Vulnerability Mapping

(Source: www.gsi.ie, annotation by J.B. Barry and Partners)

3.3 Flood Regime of the Area

The National Flood Hazard Mapping Website www.floodinfo.ie does not show any records of historic flooding occurring at the proposed development site. The nearest floods to have occurred to the proposed development site occurred in Douglas in 2002 and 2012 and in Rochestown in 2014. The recorded floods within the vicinity of the site are shown in *Figure 3-4* below.

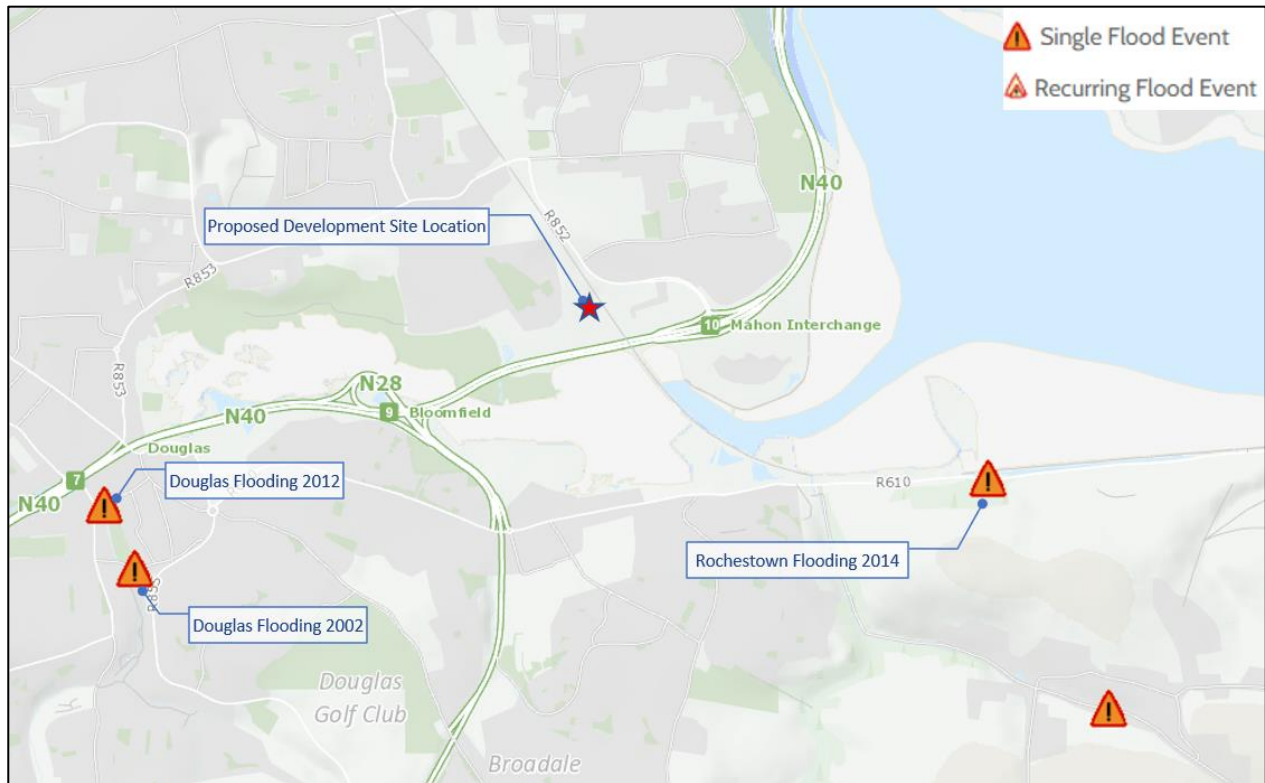


Figure 3-4: Location of historic flooding in the vicinity of the proposed site
(Source: www.floodinfo.ie annotation by J.B. Barry and Partners)

3.4 Existing Flood Studies

3.4.1 CFRAM Study

The OPW, as lead agency for flood risk management in Ireland, is producing Flood Risk Management Plans (FRMP), in line with National Flood Policy and the requirements of the EU Floods Directive. Draft FRMP's are currently being produced by the OPW under the CFRAM Study. The Draft FRMP's make use of the information provided through the flood maps that have previously been produced under the CFRAMS Programme and previous parallel projects. The Draft FRMP's set out a range of proposed measures and actions to manage and reduce flood risk within the catchments and coastal reaches covered by each Draft Plan, focusing on the three hundred areas of potentially significant flood risk around Ireland that were identified under the PFRA. The Flood Maps associated with the FRMP's are currently being finalised and will be made available online to view when the Draft Plans are published for consultation.

Figure 3-5 overleaf is an extract from the CFRAMS coastal flood extent map showing the flood extent of the Douglas Estuary. The full CFRAMS flood extent map is included in Appendix 1. However, it should be noted that no proposed development will occur at this portion of the site. Observation of the map shows that the proposed development site lies outside of Flood Zones A and B and is therefore considered to be located within **Flood Zone C**.

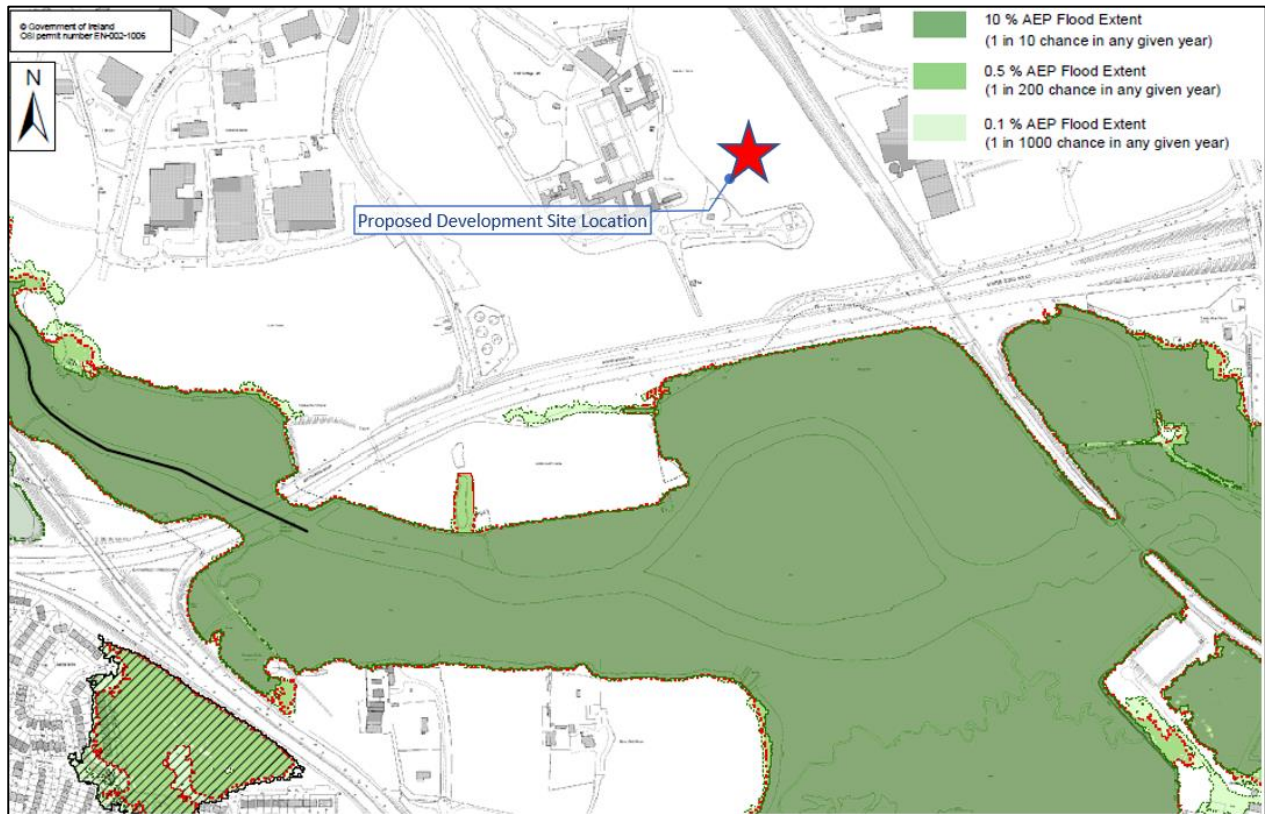


Figure 3-5: Extract CFRAMS Coastal Flood Extent Map

3.4.2 Cork City Council Development Plan 2015-2021

The development plan for Cork City came into effect in 2015 and it sets out Cork City Council's policies for the development of the city to 2021 and beyond. This includes detailed planning strategy and land use zoning as appropriate for the areas of the district including Bessborough. In accordance with best practice, Cork City Council has provided an interactive indicative flood risk mapping on a county wide basis which is included in the Local Area Plan.

An extract from the flood risk map prepared in the vicinity of the proposed development site is shown below in Figure 3-6. Observation of Figure 3-6 demonstrates that the development site is outside of both Flood Zones A and B and can therefore be considered to be located within Flood Zone C where the risk of flooding is lowest. This is consistent with the CFRAM flood mapping.



Figure 3-6: Extract from the Interactive Cork City Council Flood Risk Mapping
(Source: www.corkcoco.com, annotation by J.B. Barry and Partners)

SECTION 4: FLOOD RISK ASSESSMENT

4.1 Introduction

As outlined in Section 2 of this report the FRM guidelines identifies three stages of Flood Risk Assessment namely;

- Stage 1: Flood Risk Identification
- Stage 2: Initial Flood Risk Assessment
- Stage 3: Detailed Flood Risk Assessment

4.2 Flood Risk Identification

According to the FRM Guidelines, flood risk identification is the process for deciding whether a plan or project requires further investigation. This is a desk-based exercise based on existing information. All the existing information is described in Section 3 and the identification of flood risk from each of the five sources of flooding (coastal, fluvial (river), groundwater, pluvial (rainfall) and from artificial drainage systems) is considered.

Coastal Flood Risk

The CFRAMS Map in *Figure 3-5* and Cork City Council flood maps in *Figure 3-6* both indicate that the proposed development site lies outside of the 0.1% AEP coastal flood event and hence is located within **Flood Zone C** for Coastal flood risk, where the risk of flooding is low.

Fluvial Flood Risk

The Cork City Council flood maps in *Figure 3-6* indicates that the proposed development site lies outside of the 0.1% AEP fluvial flood event and hence is located within **Flood Zone C** for fluvial flood risk, where the risk of flooding is low.

Groundwater Flood Risk

The aquifer vulnerability map (refer to *Figure 3-3*) classifies the site as having a 'high vulnerability' which indicates a high-water table and hence a risk of groundwater related flooding. However, there is no historical evidence of groundwater flooding at the site. There is no indication on the maps of any springs or wells on this site. Groundwater risk is therefore not considered to be significant.

Pluvial Flood Risk

The OPW Summary Local Area Report shows no indication of previous pluvial related flooding at the site. During extreme rainfall events the application of SuDS principles will ensure surface water is managed sufficiently and sustainably discharged to the drainage network. With these mitigation measures in place pluvial flood risk is not considered to be significant.

Artificial Drainage Systems Flood Risk

No artificial drainage systems have been identified at the proposed site, and consequently artificial drainage systems flood risk is not relevant.

4.3 Initial Flood Risk Assessment

The Flood Risk Assessment has identified that there is a low flood risk to the development on site. Under the sequential approach identified in the FRM Guidelines a three-step approach is required to confirm the appropriateness of the development in terms of flood risk.

Step 1: Identification of the Flood Zone at the proposed development site

Using the Flood Zone criteria from the FRM Guidelines and as defined in Section 2 previously, the flood zones for each of the sites were determined.

- **Flood Zone A** – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 year for river flooding or 0.5% or 1 in 200 for coastal flooding);
- **Flood Zone B** – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 year and 1% or 1 in 100 year for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 year for coastal flooding); and
- **Flood Zone C** – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding).

As discussed in Section 4.2 above, the proposed development site lies within **Flood Zone C** – where risk of flooding is lowest.

Step 2: Identification of the vulnerability of the type of the proposed development (Table 3.1 of the FRM Guidelines)

The different types of proposed infrastructure are then assigned a vulnerability classification according to the definitions in 'Table 3.1 – Classification of vulnerability of different types of development' of the FRM Guidelines.

As described in Section 1.2 above, the proposed development is for residential purposes. This is classified as 'highly vulnerable development'.

Step 3: Using the matrix of vulnerability versus Flood Zone (Table 3.2 of the FRM Guidelines), identify the necessity for the justification test for the proposed development

The proposed development site is located in Flood Zone C and is categorised as Highly Vulnerable Development. Table 3.2 of the FRM guidelines and Figure 3.2 – Sequential approach mechanism in the planning process (FRM guidelines) stipulate that a justification test is not required for such a development and is deemed appropriate development for the flood zone categories. *Figure 4-1* below highlights the matrix of vulnerability versus flood zone.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 3.2: Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

Figure 4-1: Matrix of Vulnerability versus Flood Zone to illustrate appropriate development

4.4 Detailed Flood Risk Assessment

Following from Stage 2 – Initial Flood Risk Assessment, it was determined that there is no requirement to undertake a detailed flood risk assessment on the proposed development. The vulnerability matrix as shown in *Figure 4-1* identifies that there is no need for a Justification Test to be undertaken.

SECTION 5: CONCLUSIONS

5.1 Summary of Results

A flood risk assessment for the proposed SHD at Bessborough, Blackrock, Co. Cork has been undertaken in accordance with the methodology recommended in the FRM Guidelines. The following is the summary of the flood risk assessment:

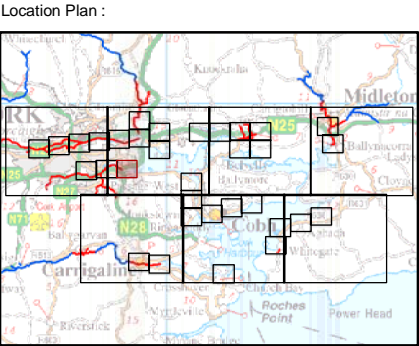
- The Douglas Estuary flows in an easterly direction and discharges to Lough Mahon to the south of the site. Historical flood data gathered from www.floodmaps.ie has indicated that there is no history of flooding at the site.
- The CFRAMS Map and Cork City Council Flood Map both indicate that the site lies outside of Flood Zones A and B and can therefore be considered to be located within **Flood Zone C**.
- The type of development is defined as 'Highly Vulnerable Development'. Using the sequential approach mechanism, it is assessed that a justification test is not required for the proposed development.

5.2 Impact of the proposed development on the existing flood regime of the area

To prevent any increased flooding that may arise from this development, it is proposed to implement SuDS measures, as discussed in detail in the Services Infrastructure Report, in order to limit the discharge from the site to the greenfield discharge rates. The implementation of these SuDS measures will ensure that there will be no increase in the risk of flooding elsewhere as a result of the development. It is therefore considered that the proposed development will have a negligible impact on the existing flood regime of the area.

Appendix 1:

CFRAMS Map



EXTENT MAP

- Legend:
- 10 % AEP Flood Extent
(1 in 10 chance in any given year)
 - 0.5 % AEP Flood Extent
(1 in 200 chance in any given year)
 - 0.1 % AEP Flood Extent
(1 in 1000 chance in any given year)
 - Defended area
 - High Confidence (<20m) (10% AEP)
 - Medium Confidence (<40m) (10% AEP)
 - Low Confidence (> 40m) (10% and 0.1% AEP)
 - High Confidence (<20m) (0.5% AEP)
 - Medium Confidence (<40m) (0.5% AEP)
 - Low Confidence (>40m) (0.5% AEP)
 - River Centreline
 - Node Point
 - Node Label (refer to table)

USER NOTE :

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Project :
**LEE CATCHMENT FLOOD RISK
ASSESSMENT AND MANAGEMENT STUDY**

Map :
DOUGLAS

Map Type : **FLOOD EXTENT**
Source : **TIDAL FLOODING**
Map area : **URBAN AREA**
Scenario : **CURRENT**

Figure By : Valeria Medina Date : 21 June 2012
Checked By : Paul Dunne Date : 21 June 2012
Approved By : Clare Dewar Date : 21 June 2012

Figure No. :
M9/UA/EXT/CURS/020

Revision
1

Drawing Scale : 1:5,000 Plot Scale : 1:1 @ A3